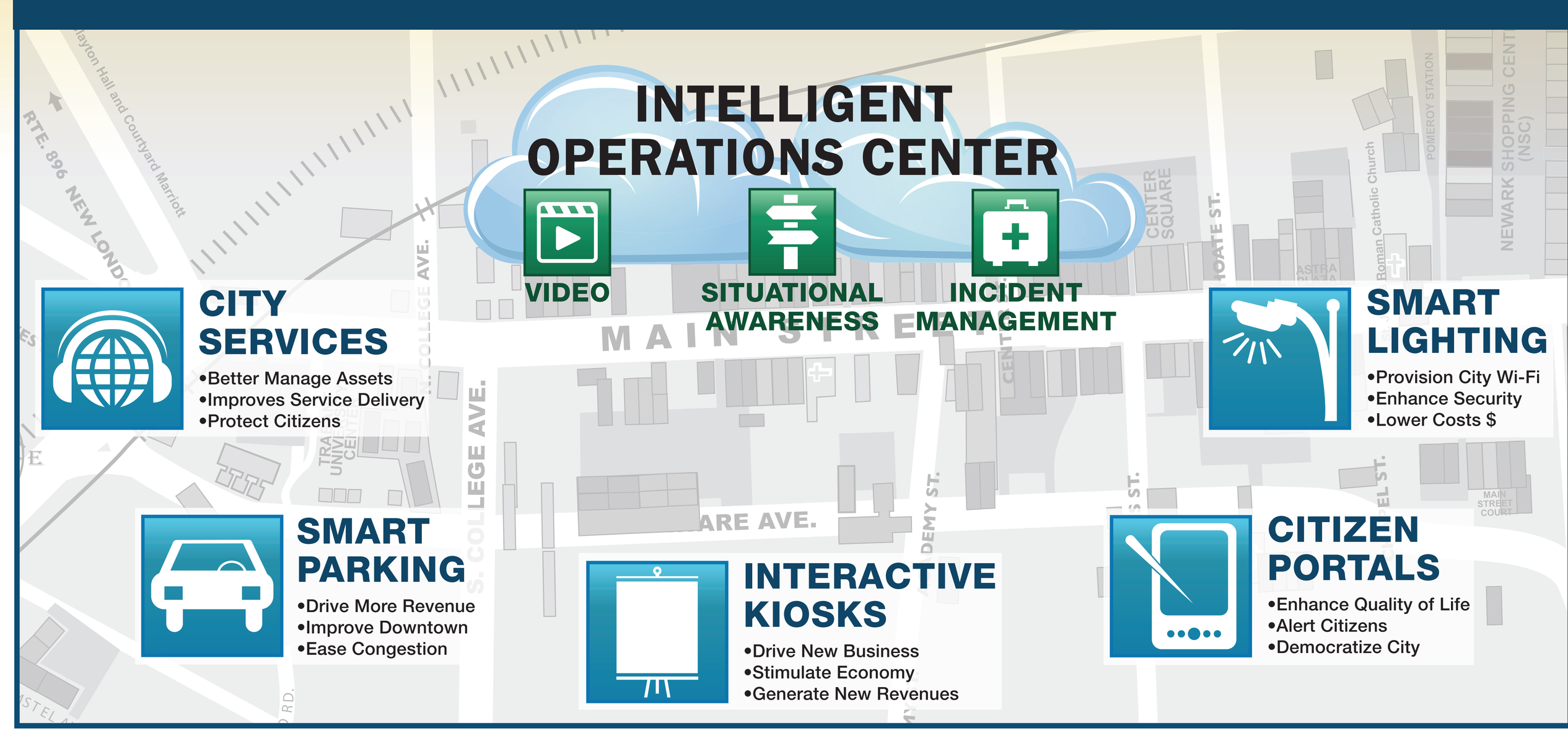
IDEAL SAFE + SMART NEWARK, DE

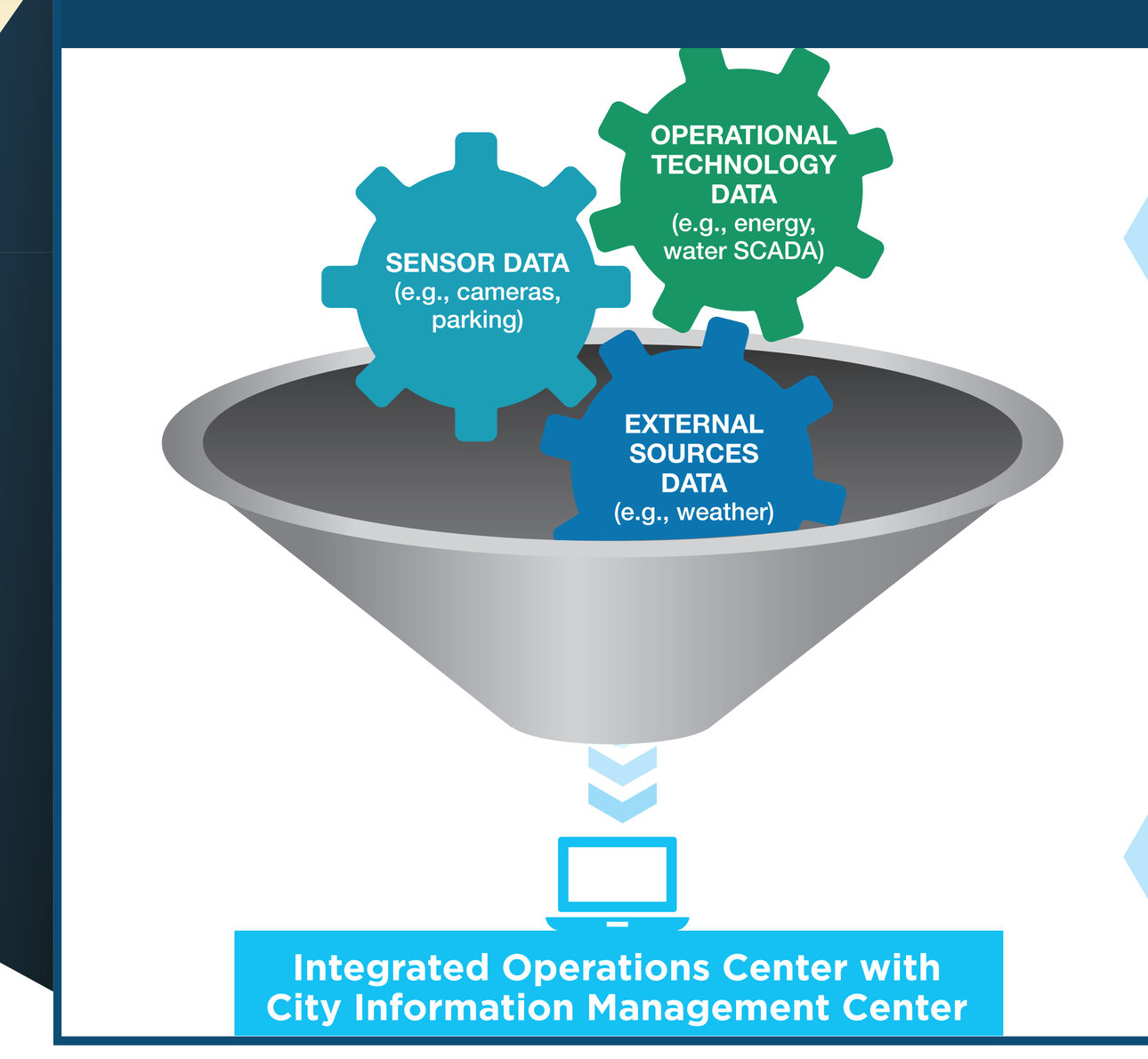
Ideal Safe + Smart State

- Functioning Integrated Management System
- High level of data inputs and improved analytical processes
- Leverage economic development opportunities
- Additional Sources of Revenue
- Improved Connectivity with Citizens

SAFE + SMART USE CASES: HOW CITY LIVING COULD CHANGE



ANATOMY OF IDEAL SAFE + SMART NEWARK: TECH PERSPECTIVE



OPERATIONS LEVEL/DATA INPUTS

Operations Level Key Features

- Optimized operations within individual departments and systems
- Phased Expansion of "Things" of the "Internet of Things"
- Automated intake of data from external systems

INTEGRATED MANAGEMENT/ ANALYTICS LEVEL

Integrated Level Key Features

- One screen to view multiple sources of data for unified management
- Expanded connectivity and enhanced citizen experience
- New sources of revenue and economic development

FUTURE PHASES

Future Phases: Scale Up

- Keep building on the foundation in future phases by ensuring that future investments by City – no matter where – have the capability to provide input to a city-level information management platform (i.e., use open technologies that can plug into the main system)

INFORMATION TECHNOLOGY RECOMMENDATIONS

Expand Capabilities of Geographic Information System (GIS) Platform
Tags: Future Phase

Observed Challenge/Risk: The city has deployed a Geographic Information System (GIS) but does not have special industry data models for electric and water that allow modeling those systems and enabling the tools engineers, managers and field resources need to manage the lifecycle of key and critical infrastructure assets, including water, electric utility equipment, transportation, communications and other important assets.

Potential Impact(s): The simpler the model the less it can do for you. The less it can tell you before, during and after a disaster or man-made event, and the less information you have to react with. There is little or no way of identifying at-risks assets that could be better protected if they were known to be at-risk of damage/destruction. Post an event those assets damaged, but not modeled in GIS, would likely take longer to identify, quantify and plan for a swifter recovery.

Identified Solution(s)/Action Plan: Utilize the existing ESRI GIS software licenses available to the city. Systematically plan to expand the GIS model of key/critical city assets including Water, Wastewater, Stormwater, Electric, Transportation, Communications and other models on a common GIS platform. Provide city employees and contractors mobile GIS enabled devices to enable individual assets to be identified with their unique installation characteristics. These enhanced models support analysis tools that can greatly assist the City in planning long term and also short term emergency situations. Applications supporting Water loss detection, Storm water capacity planning, electric outage and switching planning, and many others are available. Identify high-value assets, and assets of potential economic interest, combine GIS data and layers of information that could be shared outside of the city to feature key services, access to technologies that could spur the interests and attract potential businesses to locate to Newark.

Key Benefit(s): Provides Map-centric, intuitive way to model, edit, design, maintain, and manage city infrastructure assets. Enforces rules and standards for data maintenance of recorded assets. Improves identification and accuracy of adjacent infrastructure, helps avoid errors, lowers costs and expedites service and recovery response. Facilitates and improves maintenance, recording of costs and planning efforts.

ROM Cost: $250,000 – $500,000 depending on the current data holdings and departments participating in GIS (Water, Sewer, Electric, Others)

Citizen Connectivity, Safety and Security:
Tags: Future Phase

Observed Challenge/Risk: Citizens wishing to shop, dine and find entertainment choices downtown are confronted with navigating various impediments and obstacles. These include: navigating traffic congestion searching for open parking spots, finding convenient parking close to their chosen destination, parking in an area that is well lit and provides for a sense of safety & security, and parking in an area convenient enough so as to not risk a parking ticket.

Potential Impact(s): Citizens and visitors alike are distracted by having to pay attention to limited on-street parking, or finding options such as in the rear of businesses. This distraction likely impacts multiple aspects of Newark's community, including: Increased and needless traffic congestion on Main Street, traffic hazards/accident to drivers cutting lanes, increased traffic/pedestrian incursions and injuries, increased air pollution, a need for increased police patrols, and economic impact to downtown business and loss of tax revenues.

Identified Solution(s)/Action Plan: Leveraging existing city assets, build-out an Intelligent Multi-Service Node platform to turn LED streetlight fixtures into sensor-equipped, smart devices capable of capturing and transmitting data near real-time, enabling new applications and services (lighting, parking management, safety and security, environmental monitoring, location-based etc.). Scale the deployment in concert with other recommendations to address Newark's most pressing issues first. Provision and promote new apps and services to the public to encourage use and uptake.

Key Benefit(s): Improvements to the downtown business community, greater satisfaction amongst citizens and visitors, improved safety, healthier environment and a more robust economy for Newark through increased tax revenues and the ability to attract businesses to the city. Significant additional revenues, and an increase in services fees.

ROM Cost: A composite total of $1,320,000 for Smart Parking and Smart Lighting.

Estimated Returns: Over a 10 year period the total estimated returns (savings and revenue) are projected to be $4,870,000

Intelligent Operations Center:
Tags: Future Phase

Observed Challenge/Risk: Currently most City departments are siloed, with corresponding incidents, accidents, threats and operational issues being dealt with by the respective departments. There exists no centralized means to assess a multitude of events, such as a severe weather event (i.e. a hurricane) that may impact the city across all departments. Additionally, there is no means to accumulate, assimilate and disseminate multiple sources of data, or parse single data streams and route them to personnel in an orderly, logical manner so as to better predict, plan and recover from events.

Potential Impact(s): As the City of Newark grows, so too will the data from sensors and devices such as traffic, video, and a host of other network sensor devices tied to equipments and city owned assets of many forms. From a situational awareness perspective, it would be difficult, if not impossible to handle a situation requiring the close coordination of multiple departments, police, state and federal agencies and other organizations. This may delay critical response, result in greater damage or loss, and negatively impact the City of Newark's core values.

Identified Solution(s)/Action Plan: Design, install and staff an Intelligent Operations Center to provide a fully unified and integrated control environment overseeing all aspects of Newark's operations & infrastructure.

Key Benefit(s): The end-to-end integrated platform would provide a true city-wide situational awareness command and control environment by providing functions such as camera control, remote PC control, parking/traffic and incident management, and alarm response from one station with fewer resources that staffing siloed departments currently require.

ROM Cost: $900,000

Weather Observation System Platform
Tags: Future Phase

Observed Challenge/Risk: Currently the city utilizes NOAA's weather service for detecting the potential of severe weather events and threats, a service that only provides for broad (macro) area forecasts and data. This is free information, but not of the quality and delivery form effectively integrated into the City's operational processes.

Potential Impact(s): More frequently severe weather threats are very localized (i.e. thunderstorm microburst, straight-line winds, flash-floods, and tornadoes), that are not readily detectable in NOAA's service. These events have the potential to significantly impact the city operations, safety and lives of its citizens. Accordingly it is difficult for city emergency management personnel and city staff to proactively plan, stage and recover from events, as resources (personnel, equipment and other essentials) may be delayed, misallocated, or placed in harm's way as a result of inaccurate or insufficient weather data.

Identified Solution(s)/Action Plan: Subscribe to a weather service that gives specific accuracy (micro climate data) to the city of Newark and offers also to expand or tighten the weather sensing network locally in Newark at key facilities and installations.

Key Benefit(s): Provides timely weather information to support city decisions and influence city day-to-day operations. Likely to reduce power outage duration, revenue loss and improve safety by offering detailed insight of weather events and being able to proactively place resources in service before, during, and after an event.

ROM Cost: $20,000 – $40,000 annual service fee, depending on extent of services.

SECURITY

Implement a Situational Awareness Platform:
Tags: Future Phase

Observed Challenge/Risk: The City currently faces an array of risk and threats, alongside of many opportunities to improve the general function of city employees and the citizens. While some of these risks or challenges are met daily with a strong workforce and technologies, the city still lacks a single view into situations they face.

Potential Impact(s): Potential threats or hazards are difficult to handle for many reasons. Most of the time they cannot be holistically planned for and resourced around, but that's not a defense for lack of visibility. Gaining visibility from new data sources and consolidating data from the existing strategic sensor infrastructure can lead to profound gains in situational awareness. Any event, from public unrest, to flooding, to unauthorized access at critical infrastructure can be moments where every second counts.

Identified Solution(s)/Action Plan: Implement a situational awareness platform which enables Newark to gain visibility across city assets and critical safety points by unifying data with video. Further clarify for responders the geo-location of any event type.

Key Benefit(s): Visiblity in times of need can minimize impact of most events and help diffuse an array of day-to-day situations

ROM Cost: $350,000, plus $30k annual support, plus $40k per adapter to third-party system/technology

ENERGY RECOMMENDATIONS

Solution for Substation Automation and Modernization
Tags: Future Phase

Observed Challenge/Risk: Not all of the nineteen (19) electrical sub-stations around the city are automated, and have electro-mechanical manually operated relays requiring human action in the event of an electrical trip/fault outage.

Potential Impact(s): In the event of a storm, man-made event (i.e. construction damage, accident or intentional act), or other cause of failure where damage to a section(s) of the city is realized, the current system requires the intervention of city staff. This requires staff being on-site to assess the situation, and to physically reset the electro-mechanical relays impacted. This human physical intervention slows the response time to correction, causes longer outages to residents and businesses, and places an additional cost burden on the city operations. Additionally the older design potentially allows greater system wide damage to occur due to the lack of automated analytics and operation.

Identified Solution(s)/Action Plan: Continue to upgrade the electro-mechanical relays with state-of-the-art automation. Implement improved control schemes and grid protection measures afforded by newer technology and sensor detection.

Key Benefit(s): Provides enhanced means to protect assets, freeing staff to focus on core operations, service and ongoing system-wide improvements. Provides automated means to detect and analyze anomalies, record events, and restore service without human intervention. Assists in better predicting pending equipment failure, and identifying system vulnerabilities. Saves time, money (labor, fuel, vehicle wear & tear, and equipment cost) and extends the life of other grid assets.

ROM Cost: $50,000-$75,000 per remaining sub-station for relay retrofit

Solution for Automatic Reclosing and Loop Automation:
Tags: Future Phase

Observed Challenge/Risk: Ability to restore power as quickly possible when storms or other causes create faults on the Electrical System. A comprehensive Loop Automation Reclosing Scheme across multiple substations will optimize customer reliability and reduce operating costs.

Potential Impact(s): Reduce costs associated with power outages and the number of customers that experienced a power outage or disruption.

Identified Solution(s)/Action Plan: Integrate new feeders from new Station into existing adjacent (Kershaw) substation area on the 38kV trunk. Optimize the design to minimize capital costs for new equipment and leverage the existing plant to the fullest.

Key Benefit(s): Customer Satisfaction, Cost Avoidance, Minimize Outages, Key component of smart grid and distribution automation.

ROM Cost: $400,000 - $500,000 depending on cost optimized design

Solution for Power Optimization
Tags: Future Phase

Observed Challenge/Risk: Optimizing Voltage on Distribution Feeders under all conditions

Potential Impact(s): Voltage Control Systems have been used for years, and have helped Utilities manage voltage on seasonal basis to account for different consumption patterns throughout the year (Winter, Summer, Spring, Fall). These manual schemes are altered every few months, however under-serving or over-serving customers, losses due to sub optimal power factor, and the loading on transformers and other equipment remain an issue. Modern Power Optimization Software Control systems optimize voltage automatically and integrate with automatic reclosing schemes. The voltage control system must also adjust to abnormal feeder configurations, such that voltage is not merely controlled, but rather optimized.

Identified Solution(s)/Action Plan: Conduct a thorough engineering study of the Kershaw and adjacent substation areas to determine cost/benefit of different proven approaches of implementing advanced voltage and power factor control system.

Key Benefit(s): Identifies a cost effective approach to optimizing voltages and power factor on the feeders in the multi-substation network area along with an implementation plan. Voltage may be reduced 1% - 3% from the present levels.

ROM Cost: $200,000 – $350,000 depending on cost optimized solution design and specific requirements

ENERGY + WATER RECOMMENDATIONS

Consider Common Supervisory Control and Data Acquisition (SCADA) Platform for Water and Energy:
Tags: Future Phase

Observed Challenge/Risk: Limited application/deployment of SCADA system for the most effective real-time monitoring and control over equipment and facilities associated with Water, Electric and Transportation networks and systems. Little or no capability to monitor and operate functions remotely, link to other systems and sensors, or across departments, or correlate historical information related to an event.

Potential Impact(s): The current system requires staff be vigilant over every aspect of operations to ensure standards are met, as well as ensuring control over operational efficiencies within the treatment plant. Where constant human interaction is essential to plant operations, the use of staff resources is not optimized to best serve the greater needs of the water or electric department, the city, and its residents. Additionally, the reliance on key personnel, rather than automation is the fallibility and availability of humans to oversee control on a second-by-second basis 24/7/365, especially during times of crisis.

Identified Solution(s)/Action Plan: Evaluate the implementation of a common SCADA platform and data historian for managing and controlling the electric and water networks. Study systems interoperability and open IT standards needs, assess optimal product capabilities/limitations to leverage the SCADA for both water and electric as the basic platform for the city to utilize and share data across the other operating departments, then implement.

Key Benefit(s): Integrates disparate devices to be able to manage the network as a single entity, allows sharing of information. Improves operational efficiencies for the network and when integrated across departments improves efficiencies across all departments. Provides for maximum operating efficiency, treatment and savings.

ROM Cost: $100,000 – 150,000 to assess viability common, proven industry leading SCADA Solution

FIRST PHASE

First Phase: Build on Strong Foundation

- Address immediate needs/take best advantage of emerging opportunities, but find ways which also build the foundational elements for a Safe + Smart City.
- Leverage existing assets and opportunities, but perhaps expand upon them
- Look at strengthening operation of specific infrastructure areas as well as beginning to develop integrated

INFORMATION TECHNOLOGY RECOMMENDATIONS

Citizen Experience, Citizen Engagement Portal:
Tags: First Phase, Foundational

Observed Challenge/Risk: Citizens, visitors, businesses and City agencies & staff alike have a limited means of communicating interesting, important or imperative news and information concerning the City, its community and the day-to-day needs. Such rudimentary needs of way-finding, alerting and notification of important events, or impending dangers posed by threats cannot be mass communicated through multiple media outlets or smart devices.

Potential Impact(s): The lack of media and digital communications channels places Newark, its citizens and businesses at a disadvantage by not leveraging current Information Technologies to their fullest potential. Digital media communications, through multiple channels and devices, can best communicate awareness of Newark's services, current events, businesses, and better serve its citizens while improving on Newark's Core Values. These limitations may inhibit businesses from achieving their potential, citizens from getting real-time/near real-time information, and delays in responding to events and threats to the community.

Identified Solution(s)/Action Plan: Design, implement and scale up an Urban Services Citizen Engagement Portal built on a backbone of a Newark City Services Wi-Fi platform, consisting of fixed Citizen Experience Interactive Engagement Kiosks located in the downtown core, and apps built on a Mobile Development Platform. Explore various scalability options, and business models to lower cost of deployment, risks and rewards.

Key Benefit(s): Improvements to the downtown business community in terms of increased awareness of services, a more engaged, involved & aware community, a safer more alert Newark constituency. Potential to drive significant revenues, mitigate trend of loss of funds to support City operations, and attract new businesses to Newark to increase the tax base.

ROM Cost: A composite total of $2,000,000 for Main Street City Wi-Fi and Citizen Engagement Portals

Estimated Returns: Over a 10 year period the total estimated returns (savings and revenue) are projected to be between $1,500,000 and $2,500,000

SECURITY

Implement Crisis Communications & Alerting System:
Tags: First Phase, Quick Win

Observed Challenge/Risk: The City currently utilizes several alerting methodologies; there is not one single unified system that can address the multi-stakeholder needs. One system is used for city staff and citizens, while separate and different alerting solutions are utilized to reach other potential crisis participant groups and organizations.

Potential Impact(s): Potential threats or hazards, such as a train derailment carrying hazardous, explosive or toxic materials would likely require multi-agency response and management, along with 'shelter in place' or evacuation notifications. The lack of a unified reporting, alerting and crisis communication platform would likely slow the essential response times across multiple agencies, impose the potential for greater loss and damage, and place both citizens and first responders at greater risk.

Identified Solution(s)/Action Plan: Implement a unified solution that enables the City to effectively provide extensible notification capabilities to multiple stakeholders. Coordinate with external agencies, companies and organizations to receive, ingest and disseminate time sensitive critical data.

Key Benefit(s): Inclusion of the entire community would make Newark safer.

ROM Cost: Approximately the same as current licensing cost, plus one-time $20K configuration fee.

ENERGY RECOMMENDATIONS

Additional Substation for redundancy of supply to the City
Tags: First Phase, Critical

Observed Challenge/Risk: Single Sub-Transmission feed to entire city.

Potential Impact(s): Loss of asset or significant damage to asset would result in power loss for an extended period of time. Depending on severity/extent of damage to the single asset, outages could last from hours to weeks or months, impacting every facet of city services, operations and economy.

Identified Solution(s)/Action Plan: Update, refine and complete engineering/cost assessment report. Finalize procurement funding approval.

Key Benefit(s): Mitigates single point of failure, assures continuity of vital services to all of Newark citizens and businesses, and supports economic growth by citing reliability and resiliency measures.

ROM Cost: $8.9 Million, as identified in Newark 2015 capital expenditure budget. Validate estimate with other third-party Subject Matter Experts.

Solution for Substation Physical Security Monitoring
Tags: First Phase, Critical

Observed Challenge/Risk: Limited or no security cameras, and associated/advanced video analytics capabilities at nineteen (19) electrical sub-stations around the city.

Potential Impact(s): Increasingly these assets are at risk for vandalism or targeted attacks, and currently there is no means of early detection, or apprehension of suspects post any event due to there being no video or image files. By default there exists no means of detecting other anomalies through the use of on-board video analytics, therefore placing all of these assets at increased risk of damage/failure and interruption to the city.

Identified Solution(s)/Action Plan: Survey, plan and install state-of-the-art PZT (Pan/Zoom/Tilt) cameras at each substation. Install video servers, software and management systems for record keeping. Implement video analytics, including enhanced thermography, to detect suspicious activity and detect thermal anomalies that often serve as precursors and early warning of equipment failure.

Key Benefit(s): Provides enhanced means to protect vital assets, without requiring additional police patrols. Provides automated means to record, analyze and predict pending equipment failure, saving emergency manpower resources, allowing improved planned maintenance, and better serving city residents & business.

ROM Cost: $200,000 - $250,000 depending on number of cameras requried

WATER RECOMMENDATIONS

Water Reservoir and Potable Water Supply Safety:
Tags: First Phase, Critical

Observed Challenge/Risk: As a fundamental infrastructure asset to the city of Newark, one that is also integral to the region's water supply security, the 318 million gallon reservoir and its supply of potable water is at risk from natural disaster and man-made threats. At present no automated detection means exist, other than routine sampling, to protect the water supply. As an elevated concrete-lined dam, the risk for a breach is ever-present, yet no automated detection or alarm system exists to notify residents to evacuate.

Potential Impact(s): Threats include intentional and unintentional contamination, from sources originating from the White Clay Creek and catch basin area. Potential events, where contamination interrupts the Inflow would result in the reliance on a finite amount of approximately 1/3 of the stored capacity that is deemed viable and immediately useable. Long-term interruption or loss of potable water would have significant impact to the residents, businesses and university. In the event of a breach, the potential exists at a minimum for loss of stored capacity, and in a worst case scenario for loss of life, both having the potential of impacting every facet of city services, operations and economy.

Identified Solution(s)/Action Plan: Install automated sensing technologies to provide chemical fingerprinting of the water, and automated rapid response notification of potential threats. Review existing video surveillance coverage, identify gaps/weaknesses, plan and install additional cameras along with advanced video analytics to detect potential threats and provide automated notification of suspicious activity to police. Research and evaluate solutions that improve the total availability of potable water, and then implement applicable technology/equipment. Install an enhanced leak detection system, connect to crisis communications and alerting system.

Key Benefit(s): Assures integrity of water supply, and protects citizens.

ROM Cost: $TBD.

CURRENT STATE

Newark Positioned to be Safe + Smart Cities Model

- Visionary, innovative leadership
- Practice holistic team governance (not siloed)
- Possession of unique assets)
- Core values in line with safe + smart values, so technology can simply enhance the ability to achieve goals.

UNIQUE ASSETS

- ELECTRIC AND WATER UTILITY
- VOLUNTEER FIRST RESPONDERS
- UNIVERSITY OF DELAWARE CAMPUS
- HIGHLY EDUCATED COMMUNITY
- ENGAGED CITIZENRY
- VISIONARY GOVERNMENT
- EXISTING STATE + LOCAL POLICIES *which Encourage Sustainability and Resiliency*

KEY CHALLENGES + OPPORTUNITIES

INFORMATION TECHNOLOGY
- Mitigating Cybersecurity
- Ensuring City Government Continuity of Operations
- Interest in Leveraging Technology as an Economic Development Tool

FINANCE
- Identifying new sources of revenue
- Utility funds the general fund.

COMMUNICATIONS WITH CITIZENS
- Improving Citizen's Access to Information
- Enhancing Citizen Notification and Warnings

WATER
- Improving Reservoir Safety and Security
- Interest in Technology Management and Monitoring Systems
- Improving Flooding Situation, Particularly Stormwater Flooding

ENERGY/ ENVIRONMENT
- Expansion of Electric Department Technology Monitoring Capabilities
- Physical Security/Resiliency of Energy Facilities
- Interest in Expanding Solar Projects
- Reliance on DEMEC for Effectively 100% of the power to the City of Newark
- Proposed LED Streetlight Project

TRANSPORTATION
- Easing Traffic Congestion
- Development of New Parking Facility
- Railroad Safety – Shipping

PUBLIC SAFETY/ EMERGENCY RESPONSE/ RESILIENCY
- Inability to Share Monitored Feeds Between UD and City
- Dependence on Phone Communications as Primary Coordination Mechanism

CORE VALUES

- INCLUSIVE COLLEGE TOWN + HOME TOWN
- CITIZEN-CENTRIC, SERVICE ORIENTED, TRANSPARENT GOVERNMENT
- SUSTAINABLE COMMUNITY, ENVIRONMENTALLY + ECONOMICALLY
- TECHNOLOGY + INNOVATION VALUED AS MECHANISM FOR ECONOMIC DEVELOPMENT

BLUEPRINT RECOMMENDATIONS KEY

All recommendations are aligned with Newark, DE's core values and address key opportunities and benefits. All recommendations indicate how technology can play a role in hardening resiliency and optimizing operations of the City of Newark, DE.

Suggested Timing:

First Phase: start these components within 0-6 months because recommendation is considered to be critical, foundational, an already existing/planned project, or is a quick win

Future Phases: start these components between 6-18 month if possible

Why First Phase Timing?

Critical – potential for high impact and/or high level of risk of harm to City if no action

Foundational – includes a necessary prerequisite step needed to conduct other activities in future phases

Existing/Planned Project: Already in process or planned by City

Quick Win: Low to no cost to implement; easy to implement; and would be likely to accrue immediate benefits

Costs are Rough Order of Magnitude (ROM) costs.

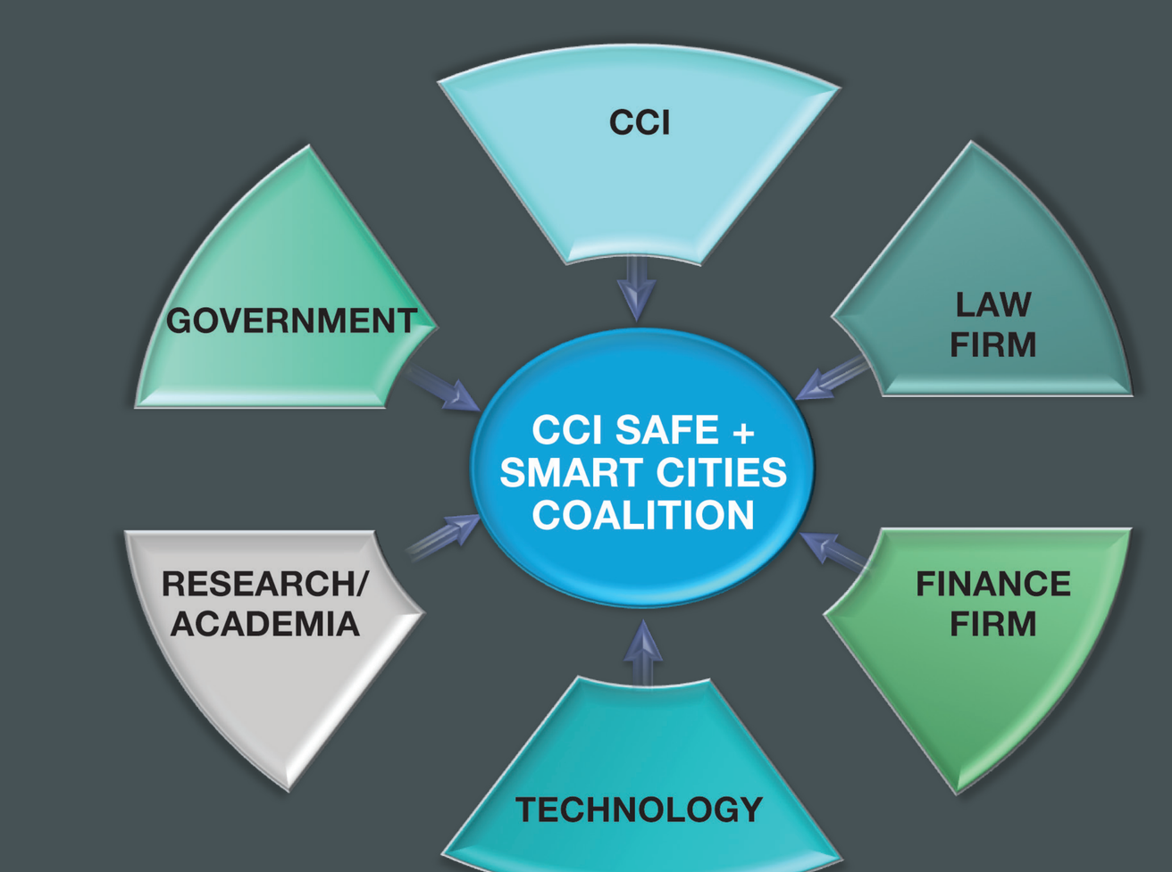
Key Characteristics:

- Offers benefits to multiple departments or solves multiple challenges
- Potential for new source of revenue generation
- Improves operational effectiveness
- Hardens Resiliency/Safety
- Extends or optimizes usage of existing assets
- Improves community cohesion and inclusion
- Economic development tool (attracts businesses or helps keep key businesses here; helps local businesses connect to customers; encourages commerce)

About CCI Safe + Smart Cities

The Chesapeake Crescent Initiative (CCI), a public-private collaborative to support technological innovation, is leading a "Safe + Smart Cities" coalition to help cities optimize their operational performance and harden their resiliency through the efficient use of technology.

The Coalition – made up of world-class experts from technology industries (Cisco, Schneider Electric, AtHoc, Verint Systems, Priority 5 Holdings), academic and research institutions (Woodrow Wilson International Center for Scholars, the University of Delaware, Virginia Tech, and the University of Maryland), government, the law (Holland & Knight), and the financial sector (National Standard Finance, LLC) – has agreed to provide pro-bono expertise and recommendations to the pilot municipalities through a collaborative framework and multi-step process.



Coalition Objectives

The Coalition aims to develop a tangible, actionable and comprehensive "safe + smart cities" approach that can:

- improve the overall operations and management of local government, both in the day to day as well as in times of adversity;
- expand capabilities in urban data collection, analysis, and dissemination;
- develop beneficial new linkages among community residents;
- help democratize and expand individual citizens' participation in government; and
- create a replicable public-private collaborative model.

Pilot Process

About CCI

CCI is a regional (VA-MD-DE-DC) collaborative to advance innovation in life sciences, security, and energy through new models of government (federal, state, and local), university and private enterprise collaboration.

Launched in 2008 by George Vradenburg and Herb Miller, along with the Governors of Maryland and Virginia and Mayor of DC, to fill a gap in our region's global competitiveness, particularly with respect to technology and innovation.

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NEWARK, DE

CCI SAFE + SMART CITIES BLUEPRINT

2015

CHESAPEAKE CRESCENT INITIATIVE
energy | life sciences | security